

REMARKS/ARGUMENTS

Claims 1-78 were previously pending in the application. New claims 79-84 are added herein. Assuming the entry of this amendment, claims 1-84 are now pending in the application. The Applicant hereby requests further examination and reconsideration of the application in view of the foregoing amendments and these remarks.

Claim Rejections and Allowable Subject Matter

In paragraph 3 of the office action, the Examiner rejected claims 1-5, 12-19, 23-25, 76, 31-35, 42-46, 51-56, 63-66, 69, and 71 under 35 U.S.C. 102(b) as being anticipated by Elko. In paragraph 4, the Examiner rejected claims 1, 12-24, 31, 42-46, 51-53, 67-68, and 71 under 35 U.S.C. 102(b) as being anticipated by Moorer. In paragraph 6, the Examiner rejected claims 27-30, 47-50, 70, and 72-75 under 35 U.S.C. 103(a) as being unpatentable over Elko. In paragraph 7, the Examiner rejected claims 20-22, 67-68, and 76-78 under 35 U.S.C. 103(a) as being unpatentable over Elko in view of Metcalf. In paragraph 8, the Examiner rejected claims 3 and 32 under 35 U.S.C. 103(a) as being unpatentable over Moorer. In paragraph 9, the Examiner rejected claims 2, 4-5, 25, 33-35, 44, 54-56, and 63-65 under 35 U.S.C. 103(a) as being unpatentable over Moorer in view of Elko. In paragraph 10, the Examiner rejected claims 10-11, 40-41, and 61-62 under 35 U.S.C. 103(a) as being unpatentable over Moorer in view of Elko, and further in view of Staple. In paragraph 11, the Examiner objected to claims 6-9, 36-39, 57-60, 26-30, 47-50, and 72-75 as being dependent upon a rejected base claim, but indicated that those claims would be allowable if rewritten in independent form. In paragraph 13, the Examiner objected to claims 6-11, 26, 36-41, and 57-62 as being dependent upon a rejected base claim, but indicated that those claims would be allowable if rewritten in independent form. For the following reasons, the Applicant submits that all of the now-pending claims are allowable over the cited references.

The Office Action Contains Contradictions Regarding the Status of Certain Claims

The status of claims 10-11, 27-30, 40-41, 47-50, 61-62, and 72-75 is not clear from the office action, because, for each of these claims, the office action contains both (1) at least one prior-art rejection and (2) at least one indication that the claim is directed to allowable subject matter. The following table indicates the locations of these contradictory statements in the office action.

<u>CLAIM</u>	<u>PRIOR-ART REJECTION</u>	<u>INDICATION OF ALLOWABILITY</u>
10	Paragraph 10	PTOL-326; Paragraph 13
11	Paragraph 10	PTOL-326; Paragraph 13
27	Paragraph 6	Paragraph 11
28	Paragraph 6	Paragraph 11
29	Paragraph 6	Paragraph 11
30	Paragraph 6	Paragraph 11
40	Paragraph 10	PTOL-326; Paragraph 13
41	Paragraph 10	PTOL-326; Paragraph 13
47	Paragraph 6	Paragraph 11

48	Paragraph 6	Paragraph 11
49	Paragraph 6	Paragraph 11
50	Paragraph 6	Paragraph 11
61	Paragraph 10	PTOL-326; Paragraph 13
62	Paragraph 10	PTOL-326; Paragraph 13
72	Paragraph 6	Paragraph 11
73	Paragraph 6	Paragraph 11
74	Paragraph 6	Paragraph 11
75	Paragraph 6	Paragraph 11

The Applicant requests clarification of the status of each of these claims.

Given the contradictory nature of the pending office action, the Applicant submits that the next office action, if any, cannot be properly made final.

The 102(b) Rejections of Claims as Anticipated by Elko are Improper

In paragraph 3, the Examiner rejected claims 1-5, 12-19, 23-25, 76, 31-35, 42-46, 51-56, 63-66, 69, and 71 under 35 U.S.C. 102(b) as being anticipated by Elko. In particular, the Examiner stated that Elko discloses decomposing audio signals into eigenbeam outputs, where "at least one of the eigenbeams has an order of two or greater," citing Fig. 24 and column 17, lines 26-33, of Elko. The Applicant submits that this constitutes a mischaracterization of the teachings in Elko.

Elko's Fig. 22 shows a microphone array having six sensors. See, e.g., column 3, lines 26-28. Elko's Fig. 24 shows how the audio signals generated by the six sensors of the microphone array of Fig. 22 can be processed to generate zero-order and first-order harmonics. See, e.g., column 17, lines 26-54. There is no teaching or even suggestion in Elko for using the signals from the microphone array of Fig. 22 to generate second-order or higher harmonics. In fact, the Applicant submits that **it is not even possible** to generate second-order or higher harmonics from the six audio signals shown in Fig. 24, which are generated by the microphone array of Fig. 22.

Thus, the Examiner mischaracterized the teachings in Elko by concluding that Elko teaches an eigenbeam having an order of two or greater. As such, the rejections of claims 1-5, 12-19, 23-25, 76, 31-35, 42-46, 51-56, 63-66, 69, and 71 under 35 U.S.C. 102(b) as being anticipated by Elko are improper and should be withdrawn.

The 102(b) Rejections of Claims as Anticipated by Moorer are Improper

In paragraph 4, the Examiner rejected claims 1, 12-24, 31, 42-46, 51-53, 67-68, and 71 under 35 U.S.C. 102(b) as being anticipated by Moorer. In particular, the Examiner stated that Moorer discloses decomposing audio signals into eigenbeam outputs, where "at least one of the eigenbeams has an order of two or greater." Significantly, the Examiner provides no support for this conclusion.

As argued in response to previous office actions, Moorer explicitly teaches the use of three microphone inputs to generate up to five speaker outputs corresponding to zero-order and first-order harmonics. See, e.g., Figs. 5 and 6 and column 5, lines 52-56. In fact, Moorer explicitly teaches that the second-order harmonics are constrained to zero. See, e.g., column 6, lines 6-7. In addition, Moorer contains vague suggestions (e.g., column 10, lines 45-48) about generating harmonics higher than first-order. Significantly, however, these suggestions are directed to the generation of higher-order harmonics during playback, not during decomposition. See, e.g., column 10, lines 47-48 ("higher harmonics may also be reproduced if there are enough speakers being used to do so"). Furthermore, there is no description as to how to achieve those higher harmonics. The Applicant submits that Moorer's disclosure at best contains a suggestion of the generation of higher-order harmonics during playback; Moorer does not provide an enabling description as to how to achieve higher-order decomposition of audio signals generated by a microphone array.

In view of the foregoing, the Applicant submits that the Examiner mischaracterized the teachings in Moorer by concluding that Moorer contains an enabling disclosure of how to decompose audio signals from a microphone array to generate an eigenbeam having an order of two or greater. As such, the rejections of claims 1, 12-24, 31, 42-46, 51-53, 67-68, and 71 under 35 U.S.C. 102(b) as being anticipated by Moorer are improper and should be withdrawn.

Claims 10, 40, and 61

According to claim 10, the microphone array comprises the plurality of sensors mounted on an acoustically soft sphere comprising a gas-filled elastic shell such that impedance to sound propagation through the acoustically soft sphere is less than impedance to sound propagation through liquid medium outside of the sphere. In rejecting claim 10 in paragraph 10, the Examiner completely ignored the amendments previously made to claim 10. Instead, the Examiner merely repeated the previous rejection. The Applicant submits that the reasons stated in response to the previous office action provide additional reasons for the allowability of claim 10 and similarly 40 and 61 as well as claims 11, 41, and 62, which depend from claims 10, 40, and 61, respectively, over the cited references.

Claims 14, 44, and 65

According to claim 14, the arrangement of the sensors in the microphone array satisfies a discrete orthogonality condition. Claim 14 depends from claim 1, which requires that at least one eigenbeam has an order two or greater. In order to be able to generate an eigenbeam having an order of two or greater, a microphone array must have a sufficient number of sensors located at appropriate positions in the array.

In paragraph 3, the Examiner rejected claim 14 as being anticipated by Elko, citing Fig. 22. While it is true that Elko's Fig. 22 shows a six-sensor microphone array whose sensors satisfy a discrete orthogonality condition, it is impossible to generate an eigenbeam of order two or greater using Elko's microphone array. Thus, Elko cannot be said to anticipate the combination of features recited in claims 1 and 14.

The Examiner also rejected claim 14 in paragraph 4 as being anticipated by Moorer. Significantly, the Examiner did not even discuss the recitations of claim 14 in rejecting claim 14 based on Moorer. Like Elko, Moorer does not disclose a microphone array that (1) can be used to generate an eigenbeam having an order of two or greater and (2) satisfies a discrete orthogonality condition. In particular, the microphone array shown Moorer's Fig. 8 is a three-sensor array that simply cannot be used to generate an eigenbeam having an order of two or greater.

For all these reasons, the Applicant submits that this provides additional reasons for the allowability of claim 14 as well as claims 44 and 65, and also new claims 79-81, which depend from claims 14, 44, and 65, respectively, over Elko and Moorer, whether considered alone or in combination.

Claim 15

According to claim 15, decomposing the plurality of audio signals further comprises treating each sensor signal as a directional beam for relatively high frequency components in the audio signals. In paragraph 4, the Examiner rejected claim 15 as being anticipated by Moorer, stating that "Moorer shows the step of treating each sensor signal as a direction beam," citing column 7, lines 60-65. The Applicant submits that the Examiner mischaracterized Moorer in rejecting claim 15.

Moorer does not teach decomposing a plurality of audio signals by treating each sensor signal as a directional beam for relatively high frequency components in the audio signals. Significantly, the passage cited by the Examiner relates to the combination of audio signals for application to speakers during playback, not the decomposition of audio signals generated by microphones.

The Applicant submits that this provides additional reasons for the allowability of claim 15 over Moorer.

Claims 27, 47, and 72

According to claim 27, the plurality of sensors are arranged in two or more concentric arrays of sensors, wherein each array is adapted for audio signals in a different frequency range. In paragraph 6, the Examiner rejected claim 27 stating that, in Elko's Fig. 22, "the sensors are arranged in two or more concentric arrays of sensors."

The Applicant is confused by the Examiner's statement. Elko's Fig. 22 shows a six-element microphone array in which all six elements are located equidistance from the center of the microphone. As such, Elko's Fig. 22 shows a microphone array having six elements located in a single spherical array. Neither Elko's Fig. 22 nor anywhere else in Elko teaches or even suggests a microphone array having two or more concentric arrays of sensors.

The Applicant submits that this provides additional reasons for the allowability of claim 27 and similarly claims 47 and 72 as well as claims 28, 48, and 73, which depend from claims 27, 47, and 72, respectively, over Elko.

New Claims 79-84

Support for new claims 79-84 is found, for example, in Equation (53). On page 9, the Examiner stated:

"On p. 15, applicant argued that Moorer fails to show the microphone arrangement satisfy orthogonality condition. However, applicant's argument is based on the disclosure in the specification. Those definitions are not clearly and explicitly stated in the claims. Therefore, the argument is not convincing."

The Applicant submits that new claims 79-84 "clearly and explicitly" recite a definition of the discrete orthogonality condition recited in claims 14, 44, and 65. As such, the Applicant submits that new claims 79-84 are allowable over the prior art.

Conclusion

For the reasons set forth above, the Applicant respectfully submits that the rejections of claims under Sections 102(b) and 103(a) have been overcome. The Applicant submits further that new claims 79-81 patentably distinguish over the prior art.

In view of the above amendments and remarks, the Applicant believes that the now-pending claims are in condition for allowance. Therefore, the Applicant believes that the entire application is now in condition for allowance, and early and favorable action is respectfully solicited.

Fees

During the pendency of this application, the Commissioner for Patents is hereby authorized to charge payment of any filing fees for presentation of extra claims under 37 CFR 1.16 and any patent application processing fees under 37 CFR 1.17 or credit any overpayment to Mendelsohn & Associates, P.C. Deposit Account No. 50-0782.

The Commissioner for Patents is hereby authorized to treat any concurrent or future reply, requiring a petition for extension of time under 37 CFR 1.136 for its timely submission, as incorporating a petition for extension of time for the appropriate length of time if not submitted with the reply.

Respectfully submitted,

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